BONE AND SIGNALING LABORATORY

RUTH GLOBUS, SCIENTIST AND CO-DIRECTOR

MARCH 2012

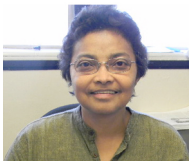
Our bone research group explores the physiological, cellular, and molecular mechanisms that control skeletal function, with the long-term goal of improving healthy habilitation in space. A team of postdoctoral fellows, graduate students and undergraduates, along with senior research staff, conduct the research of the Bone and Signaling Laboratory, often in close collaboration with other academic and government scientists. Competitively awarded grants from NASA and the Department of Energy provide the financial support that makes our research possible.

Microgravity and space radiation are fundamental physical components of the space environment that can challenge the long-term skeletal health of astronauts, both while in space and after return to Earth. We hypothesize that microgravity and radiation in space engage molecular and cellular pathways that evolved to protect the organism from environmental stresses, but also can lead to degeneration of skeletal tissue. The following are research objectives currently under study 1) Determine how ionizing radiation regulates bone marrow-derived stem cells, precursors, and differentiated progeny that are responsible for maintaining skeletal integrity during subsequent aging. 2) Determine how gravity and radiation, alone or combined, regulate fundamental cell functions such as differentiation, oxidative metabolism, intercellular communication and extracellular matrix interactions. 3) Define relevant molecular mechanisms that mediate skeletal responses to ionizing radiation and/or changes in gravity. Results obtained from this research are relevant to common bone diseases such as osteoporosis, both on Earth and in space,

CURRENT MEMBERS OF THE LAB: PERSONAL STATEMENTS

Ruth Globus (Principal Investigator): Ph.D. in Endocrinology, University of California, San Francisco. BA in Biology and Sociology from UC Santa Cruz. Member of the Space Biology Research Branch. Subject matter expert for NASA's Human Research Program and Space Biology Program in bone biology, oxidative stress and artificial gravity. Project scientist for the Animal Rodent Habitat for ISS. Sponsor of the Space Settlement Design Contest for 8^{th}-12^{th} graders.

Joshua Alwood (Postdoctoral Fellow): Ph.D. in Aeronautics & Astronautics, Stanford University. BS in Physics and Astronomy from the University of Florida. My work investigates how the spaceflight environment alters the metabolism of bone cells and results in changes in skeletal structure and strength. I participated in the Biological Tissue Sharing Program for STS-131 and 135 and routinely use the NASA Space Radiation Lab at Brookhaven National Lab.



Diane Hilton (Assistant Research Scientist):
Hi! I have been working at NASA for 6 ½ years in the Bone and Signaling Lab. I have worked three years as a student intern and 3 ½ years as a volunteer. I like my job because I have a passion for research. I even ran my own experiment. Also, I get to run biochemical assays, one of the tasks I like the best. My co-workers are the best and the environment is conducive to a fun work place. I graduated from San Jose State University with a BS in Biochemistry and Foothill College with an AS in Biotechnology.

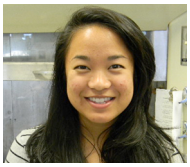
Akhilesh Kumar (Postdoctoral Fellow):
Hi! I am working as postdoctoral research fellow in Bone and Signaling Lab for 2 years. After receiving my Ph.D. in Physiology from Japan, I moved to NASA Ames for scientific research in space biology. I work on understanding the molecular mechanisms and signaling pathways regulating the origin, proliferation, differentiation and activities of bone related cells. A better understanding of effects of radiation on bone related cells needs to be addressed to reduce or prevent bone loss occurring

during space flight and radiation exposure on earth.

CONTINUED: CURRENT MEMBERS OF THE LAB PERSONAL STATEMENTS

Luan Tran (Assistant Research Scientist)
I have worked as an Assistant Research Scientist in the Bone and Signaling Lab at NASA ARC since 2010 under the mentorship of Dr. Ruth Globus. I received my Bachelors of Science in Molecular Biology from San Jose State University and have since developed an interest in regenerative medicine and stem cell biology. Aside from developing my technical skills in the areas of tissue culture and molecular assays, my time in the Bone and Signaling Lab has greatly improved my scientific independence--which will help me as I embark on a path towards attaining a PhD.

Arundhati Balid (Postdoctoral Fellow):
Hello! I am an Ames Associate Volunteer at the Bone and Signaling Lab. I received my Ph. D from India in Biotechnology and started working in the lab part-time in the capacity of a Post Doctoral Fellow. In my time here I have focused on the damage that occurs at DNA level due to radiation exposure, in an effort to understand the effects of radiation on the bone cells. Radiation exposure is a risk for the astronauts and this work will help better understand it.



Samantha Torres (Research Assistant)
I'm a Biology major at Foothill College, and I've been interning here at NASA Ames for over a year. Working in the Bone and Signaling lab, I've had the privilege of getting hands on research laboratory training, working with cell culture, and being involved in many different kinds of experiments. My internship here has only fostered my aspirations to work in the field of biology, and later on in medicine. My experiences working in the lab have taught me so much, and I'm sure that I will benefit from them throughout the rest of my academic career.

Sung-shin Choi (Research Scientist):
I joined the laboratory in early 2011 and have provided the laboratory support including histology and micro CT (computed tomography) analyses to study the effects of the radiation and microgravity on the morphology of the bones. Postdoctoral Fellow at Stanford University, Ph.D. from University of California, Berkeley and M.S. from Columbia University, New York.

Tiffany Truong (Lab Manager Intern):
I am currently a community college student working to transfer to a 4-year university and also an intern in the Bone and Signaling Lab. I have been interning in the lab for about a month now and got my internship through a program known as the Ames Community College Education and Development Program, or ACCEDP. My job includes ordering supplies, bookkeeping, and assisting lab members with their tasks or projects. I hope to learn many techniques and skills during my internship that will help me later on when I pursue a career in research in my chosen major, Neuroscience. My ultimate career goal is obtain a Ph.D in a Neuroscience discipline that would allow me to work with brain scans and conduct research on neurological diseases and disorders. Apart from the lab and school, I also enjoy traveling, taking photos, and spending time with my friends and family.

Emily Morey-Holton (Senior Scientist, Emeritus): Ph.D. in Pharmacology from West Virginia University Health Sciences Center. Elected to NASA-Ames Hall of Fame. I retired in 2005, but continue to advise this exciting laboratory. We developed the

hindlimb-unloading rodent model that is used across the world to mimic spaceflight and investigate countermeasures to minimize those changes.